

Spirally Stowed Architecture for Large Photovoltaic Arrays, Phase I

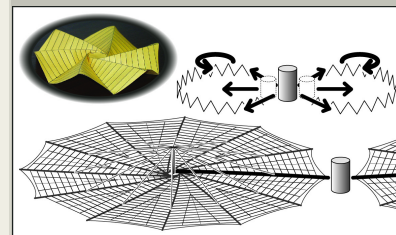
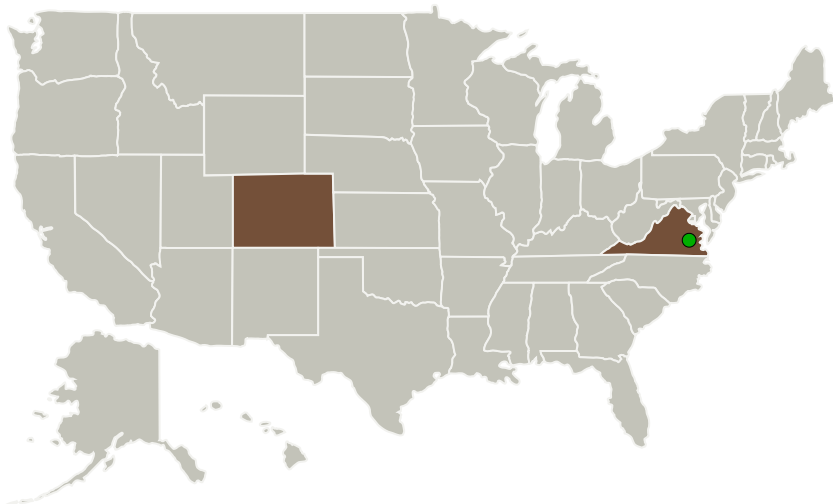
Completed Technology Project (2014 - 2014)



Project Introduction

Proposed is an architecture for large ($>200 \text{ m}^2$ surface area) photovoltaic (PV) arrays, deployable from compact stowage with one single, continuously smooth sweep of motion and directly scalable to sizes at least an order of magnitude larger to provide surface areas beyond 4000 m^2 -- the area associated with 1 MW power production, the upper limit of projected solar electric propulsion (SEP) needs in 10-20 years. In particular, examined is the integration of a version of the "spiral fold" (an origami-like surface mechanism to wrap without stretching a tessellated sheet on a hub) and wrap rib technology (supporting ribs that also wrap around the hub when stowed) with some additional concept elements to increase stiffness when deployed and the robustness of deployment. Kinematic conflicts between components with geometric mismatch in a real-life hardware context re resolved, metrics for stowage and structural performance are assessed, and a streamlined concept design is defined to satisfy all targeted specifications. TRL level is advanced from 1 to 3.

Primary U.S. Work Locations and Key Partners



Spirally Stowed Architecture for Large Photovoltaic Arrays
Project Image

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Organizations Performing Work	Role	Type	Location
TentGuild Engineering Company	Lead Organization	Industry	Boulder, Colorado
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140550>)

Images

**Project Image**

Spirally Stowed Architecture for Large Photovoltaic Arrays Project Image

(<https://techport.nasa.gov/image/127688>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TentGuild Engineering Company

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

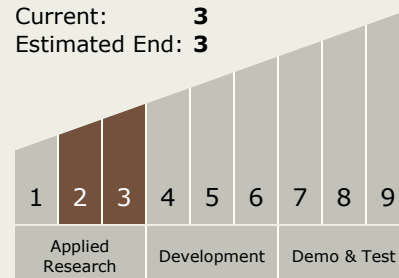
Carlos Torrez

Principal Investigator:

Gyula I Greschik

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.1 Lightweight Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System